

Decatur County Stormwater Drainage Control Ordinance

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Article 1 – General provisions

Section 1.1-Title

This ordinance will be known and may be cited and referred to as the “Drainage Ordinance of Decatur County, Indiana” and will hereafter be referred to as “this ordinance”.

Section 1.2-Purpose

To Reduce or Prevent Flood Hazard. To reduce the hazard to public health and safety caused by excessive stormwater runoff which may result when land use changes from agricultural and other non-urban land uses to more urbanized land uses.

To Reduce or Prevent Flood Damage. To reduce or prevent damage to public and private property, including existing streams, drainage channels, and stormwater drainage facilities which may be caused by excessive stormwater runoff resulting during and after land development.

To Protect and Conserve Resources. To protect and conserve water and land resources by implementing beneficial design features and conservation techniques.

To promote the conservation and sound utilization of the water resources for the benefit of the residents of Decatur County.

Section 1.3-General policy

It is recognized that stormwater runoff, erosion and sedimentation are a natural part of the Earth’s hydrologic cycle. It is also recognized that this phase of the hydrologic cycle is driven primarily by precipitation events, the intensity, duration and frequency of which are unknown but can be predicted using accepted methods to statistically extrapolated data from past occurrences. Also it is recognized that the development and manipulation of new or existing stormwater runoff storage and conveyance systems can either increase or decrease hazards to life, health, safety and property, depending upon how well these activities are accomplished. Likewise these same activities can either increase or decrease the tangible or intangible benefits associated with these same storage and conveyance systems viewed as water resources. These benefits may include aesthetics, fish and wildlife habitat, and water quality.

It is the policy of this ordinance that land or watercourse-disturbing activities should be accomplished in a manner that reduces the hazards and increases the benefits. This general policy can best be implemented by providing a unified drainage and sediment control ordinance that mandates the use of generally accepted standards and methods to achieve the stated policy. Although technical in nature, the concepts behind the specific elements contained in this ordinance are straightforward. Some of the primary concepts that form the foundation of this ordinance include:

1. Engineering plans, computations and specifications shall be presented in an orderly manner using standard engineering practice and be in compliance with the technical and administrative standards contained in this ordinance. They must be sealed by a professional engineer or land surveyor registered in the State of Indiana.

2. Minor stormwater conveyance systems such as collection swales, small ditches, street gutters, stormsewer inlets, stormsewer pipes, and entrance drive culverts should be designed to convey the peak discharge from the 10 year frequency storm event in open channel flow conditions (pipes) or within the channel banks (swales and ditches). A stormwater conveyance system is considered a minor system until its total upstream drainage area, including onsite and offsite contributions, exceeds 50 acres in size.
3. Major stormwater conveyance systems such as creek or large ditch channels and culverts, stream enclosures, etc. must be designed to convey the peak discharge from the 100 year frequency storm event within the channel banks. Systems draining more than a total of 50 acres are considered major stormwater conveyance systems under this ordinance.
4. All minor stormwater conveyance systems shall include a provision to address the safe conveyance of the peak discharge from the 100 year frequency storm event through the use of secondary or emergency overflow conveyances such that floodwaters do not inundate building structures or unreasonably disrupt transportation or other critical operations.
5. Land development and other drainage activities shall attenuate runoff rates to protect downstream properties from the impacts of development. The design should address both quantitative and qualitative impacts to the overall watershed. Great attention should be given to the capacity and condition of the downstream receiving waterway in terms of its ability to accept runoff from the developed or otherwise altered upstream property.
6. Land development and other drainage activities shall not increase the back-up of stormwater onto other public or private property unless legal or administrative provisions are in place to accommodate this occurrence. This provision should be applied to both normal and flooding conditions.
7. Land development and other drainage activities shall be designed to minimize the erosion of top soil and movement of this sediment onto downstream or adjacent properties.
8. Land development and other drainage activities shall be designed to reasonably minimize the degradation of the natural environment and where possible, improve the water resource benefits.
9. Land development and other drainage activities shall be designed to reasonably protect the general public from life and safety hazards through the use of such concepts as child-protection grates over larger open pipe inlets, safety ledges on detention ponds, maintainable side slopes, security fencing where prudent, guardrails to protect vehicles from entering waterways, limited road overflow design depths, etc.
10. Any underground drainage system such as farm tiles or stormsewers encountered or disturbed by a construction activity of any kind shall be reconnected or otherwise dealt with in a manner that will maintain the system at a level of functionality at least as effective as it was prior to the construction activity.
11. Underground drainage systems encountered or impacted during construction of any kind that contain unauthorized effluent from sanitary systems or other waste producing

activities should have onsite polluting connection redirected to an acceptable wastewater treatment facility such as an approved sanitary sewer or onsite wastewater treatment system. If the effluent is from offsite sources, the matter should be brought to the attention of the county health department prior to the reconnection of the underground drainage system, if possible. If delay in the reconnection of the underground drainage system not possible due to site conditions, the system can be reconnected, however the location and nature of the apparent contamination should be recorded and official notification made to the county health department staff for further evaluation and resolution.

12. The HERPIC County Storm Drainage Manual, September 1994 Edition or later, Indiana Drainage Handbook, Indiana Handbook for erosion control in developing areas and the hydrographic techniques and modeling methods contained therein are approved by the board for use in determining stormwater runoff and storage.

Section 1.4-Applicability

This ordinance regulates improvements or changes to stormwater drainage systems and/or erosion and sediment control systems that are not specifically waived by this ordinance. These activities may be related to land development, redevelopment or other land or watercourse disturbing activities including but not limited to:

1. Changes to the ground contours including non-exempt construction projects.
2. Increases in the runoff rates or volumes due to land use changes.
3. Changes to the drainage patterns or capacity.
4. Changes to the land surface that decreases the rate at which water is absorbed.
5. Changes to or creation of a stormwater facility.
6. Construction, enlargement or location of any non-exempt building on a permanent foundation.
7. Creates a non-exempt pond or other stormwater storage area or affects the performance of an existing non-exempt impoundment.

Drainage approval is not required for the following activities:

1. Excavation of cemetery graves.
2. Refuse disposal sites where stormwater drainage is controlled by other regulations.
3. Excavation for wells, excavation and backfills for poles, conduits and wires of utility companies. Large utility projects that impact the drainage patterns of the area may require a permit at the discretion of the plan review staff.
4. Exploratory excavations or soil testing under the direction and control of professional

engineers, soil engineers, geologists, civil engineers, architects or land surveyors, which are backfilled.

5. Ordinary cultivation or use of agricultural land including tilling, terracing, construction of drains, construction of minor open ditches or under drain tiles and crop irrigation and construction of barns, storage buildings or harvest storage facilities, all so long as such activities do not adversely impact affect offsite drainage facilities, and so long as such activity shall not change land contours greater than two feet in elevation. Land development activities that occur on agricultural land but that are related to other development uses are not exempt and will require approval under this ordinance;
6. The planting or tilling of gardens, shrubs, trees, or other common agricultural or landscaping activities so long as such activities do not reduce the conveying or holding capacity of waterways, ponds, and basins; nor interfere with the proper operation and maintenance of regulated, public, or private drainage facilities;
7. The planting and tilling of gardens, flower beds, shrubs, trees and other common uses and minor landscaping of land appurtenant to residences.
8. Fill and grading of former basement sites after the demolition of a structure, to conform to the existing grade.
9. Fill of small holes caused by erosion, settling of earth or the removal of such materials as dead trees, posts or concrete.
10. A fill less than one foot in depth placed on natural terrain with a slope flatter than four percent, not intended to support a structure, and which does not exceed one thousand (1,000) cubic yards per acre, and does not obstruct the existing drainage pattern;
11. Normal maintenance of drainage facilities unless the maintenance activities will result in changes to the local drainage patterns or create drainage impacts to adjacent properties..
12. Installation of septic systems when a proper permit has been obtained.
13. Construction or reconstruction of a driveway or driveway culvert when a proper permit has been obtained from the County Highway Department. The County Highway Department, at its discretion, can require a driveway permit applicant to submit a certified drainage design plan if the project is determined to be of adequate scope to significantly impact the drainage system.
14. Installation of building sewers when a proper permit has been obtained.
15. An enlargement or exterior change that does not exceed twenty five (25) square feet in floor area to an existing structure, when no part of the structure or the enlargement or exterior change to the structure is located in an impacted drainage area.
16. Placement of an accessory structure, not exceeding one hundred twenty (120) square feet in floor area, to a one or two family dwelling when the accessory structure is not located on a permanent foundation.

17. Exterior change to a structure which does not change the ground floor area of the structure.
18. Construction of a deck which extends over open ground and which is constructed so that water freely and directly flows through the deck to the ground below the deck.
19. Construction of excavated ponds of one (1) acre or less surface area at normal pool, that do not affect drainage runoff patterns and are fed by springs and/or wells.

Section 1.5-Conflict with other regulations

No provision of this ordinance shall relieve an individual from the requirements of other local, state or federal regulation. Where provisions of this ordinance conflict with those of other applicable local regulations, the more restrictive standard shall apply. Where the conflicting standard is contained within a state or federal regulation, this ordinance's standards will be applied to approvals under this ordinance, but will not replace or relieve the requirements contained under the more restrictive regulation. Conflicts between regulations that are mutually exclusive shall be resolved by the Decatur County Area Plan Commission on a case-by-case basis.

Section 1.6-Compliance with other regulations

In addition to the requirements of this chapter, compliance with the requirements set forth in other applicable ordinances with respect to submission and approval of preliminary and final subdivision plats, improvement plans, building and zoning permits, inspections, appeals, variances, and similar matters; and compliance with applicable state and federal laws and regulations shall be required.

Section 1.7-Area Plan Commission Technical Advisors

Technical Advisors to the Area Plan Commission (APC). The APC shall authorize and empower certain technical advisors including:

1. The Decatur County surveyor;
2. The County hired or employed or retained engineer;
3. The Decatur County soil and water conservation district.

Technical Advisors' Powers. The APC shall empower their technical advisors as follows:

1. To make reviews of submitted plans and supporting data;
2. To make recommendations to the APC with regard to such reviews; and to make other reports when so ordered by the boards;
3. To make periodic inspections before, during, and after completion of a project; and to report findings to the APC;
4. To act on behalf of the APC when so authorized, or by ordinance.

The APC encourages and advises anyone with an interest in a project to contact the technical advisors named above at the earliest possible time during the planning stage of the project.

Section 1.8-Record of APC decisions

Decisions by the APC with regard to this chapter shall be made only during regular or special meetings of the APC or during regular or special meetings of the county commissioners.

Records of actions taken by the APC with regard to this chapter shall be made in the appropriate edition of the minutes of each board's meetings.

Section 1.9-Special or emergency decisions

In special or emergency circumstances where actions must be taken quickly in order to enforce the purposes, the policies, or other requirements of this chapter, the APC the county commissioners, or their duly authorized representatives may make decisions, or take actions outside of board meetings.

Special or emergency decisions and actions of the drainage board, the county commissioners, and/or their authorized representatives shall be recorded in the appropriate edition of the minutes of each board's meetings.

Section 1.10-Permit filing and review fees

A drainage permit application filing fee and review fee are authorized by this ordinance. A schedule of fees shall be issued by the APC and updated periodically based on the cost of providing an adequate technical review of drainage permit requests. At its discretion, the APC shall retain the services of an outside engineering consultant to provide technical review services on an as-needed basis and the cost of this review shall be charged to the drainage permit applicant as part of the review fee. All outstanding fees must be paid prior to the issuance of an improvement location permit or building permit.

Section 1.11-Drainage easements

Drainage easements recorded on the final plat or property deed shall be required by the APC as a condition of final drainage approval for specific elements of a drainage system as specified in this ordinance.

Article 2-Definitions

APC

Area Plan Commission

Antecedent Moisture Condition

Antecedent soil moisture conditions are the soil moisture conditions of the watershed at the beginning of a storm. These conditions affect the volume of runoff generated by a particular storm event. Notably they affect the peak discharge only in the lower range of flood magnitudes. As the frequency of a flood event increases, antecedent moisture has a rapidly decreasing influence on runoff

Applicant

The person, persons, partnership, corporation, or other private entity, their heirs or assigns who shall apply to the board for drainage plan approval.

Board or Drainage Board

The Decatur County Area Plan Commission or Drainage Board when applicable.

Bridge

A conveyance structure which is hydraulically short and has a span measured along the centerline having a distance of twenty (20) feet or greater.

County Commissioners or Commissioners

The Board of County Commissioners of Decatur County, Indiana.

Critical Depth

Critical depth is the depth of flow at which the specific energy is a minimum. An illustration of critical depth is the depth at which water flows over a weir when no other backwater forces are involved. For a given discharge and prismatic cross-section geometry there is only one critical depth.

Culvert

A small bridge constructed entirely below the elevation of the roadway surface and having no part or portion integral therewith. Structures over 20 feet in span parallel to the roadway are usually called bridges, rather than culverts; and structures less than 20 feet in span are called culverts even though they support traffic loads directly.

Depression Storage

Depression storage is the natural depressions within a watershed which store runoff. Generally after the depression is filled runoff will commence.

Detention Basin

A facility constructed to restrict the flow of stormwater to a prescribed maximum rate, and to detain concurrently the excess waters that accumulate behind the controlling outlet.

Drainage Area or Watershed Area

The land area which stormwater is collected from, conveyed through, and/or carried off from by a drainage system.

Dry Bottom Detention Basin or Dry Basin

A basin designed to drain completely dry after providing its planned stormwater storage function.

Duration or Storm Duration

The time period, given in hours or minutes, of a rainfall event.

Engineer or County Engineer

The Decatur County engineer, or duly appointed representative(s).

Flood Elevation

The vertical limits of elevation at all locations delineating the maximum level of high waters for a flood of a given return period.

Floodplain

The area adjoining a river or stream which has been or may be covered by flood- waters; and comprising the regulatory floodway and floodway fringe.

Floodway or Regulatory Floodway

The channel of a river or stream plus those portions of the floodplain adjoining the channel which are required to efficiently carry and discharge the peak flow of the one hundred (100) year flood.

Free Outlets

Free outlets are those outlets whose tailwater is equal to or lower than critical depth. For culverts and storm drains having free outlets, lowering of the tailwater has no effect on the discharge or the backwater profile upstream of the tailwater.

Freeboard

Freeboard is an additional depth regarded as a safety factor, above the peak design water elevation.

Frequency

Frequency is the average time interval between equal magnitude floods. For example, a 25-year flood has the probability of occurrence of once every 25 years on the average, or a 4 percent chance of occurrence in any given year.

Hydraulics

Following are definitions of terms that will be important in a hydraulic analysis. These concepts will be used throughout the remainder of this chapter in dealing with different aspects of hydraulic studies and designs.

Hydraulic Roughness

Hydraulic roughness is a composite of the physical characteristics which influence the flow of water across the earth's surface, whether natural or channelized. It affects both the time response of a watershed and drainage channel as well as the channel storage characteristics.

Hydrograph

The hydrograph is a graph of the time distribution of runoff from a watershed.

Hydrology

Following are definitions of terms that will be important in a hydrologic analysis. These concepts will be used throughout the remainder of this chapter in dealing with different aspects of hydrologic studies.

Hyetograph or Rainfall Distribution

The hyetograph is a graph of the time distribution of rainfall over a watershed.

Infiltration

Infiltration is a complex process of allowing runoff to penetrate the ground surface and flow through the upper soil surface. The infiltration curve is a graph of the time distribution at which this occurs.

Interception

Storage of rainfall on foliage and other intercepting surfaces during a rainfall event is called interception storage.

Invert

The floor, bottom, or lowest part of the internal cross section of a conduit, culvert or pipe.

Lag Time (T_L)

The lag time is defined as the time from the centroid of the excess rainfall to the peak of the runoff hydrograph.

Outfall or Outlet

The point or structure at which the stormwater discharges from the system or a part thereof.

Peak Discharge (Q^P)

The peak discharge, sometimes called peak flow, is the maximum rate of flow of water passing a given point during or after a rainfall event and is usually measured in cubic feet per second. The variable “P” is the design return interval for the given discharge value.

Peak Flow

The maximum rate of flow of water at a given point in the system from a predetermined storm.

Project

Any new development, redevelopment, new construction, reconstruction, or land disturbing activity which creates an additional ten thousand (10,000) square feet of impervious surface, or disturbs five acres or more of land surface, and is regulated by this drainage chapter.

Rainfall Excess

After interception, depression storage, and infiltration have been satisfied, if there is excess water available to runoff this is the rainfall excess.

Rainfall Intensity

The cumulative depth of rainfall occurring over a given duration expressed in inches per hour.

Regional Facility

A “regional” detention/retention (D/R) facility provides flood storage for combined off-site and/or on-site watershed areas of five (5) acres or larger.

Regulated Drain or Legal Drain

A drain maintained by the county surveyor and the drainage board under Indiana Drainage Code, IC 36-9-27.

Release Rate

The amount of stormwater let go from a given land area or release point in cubic feet per

second.

Retention Basin or Infiltration Basin

A basin designed to provide storage of stormwater runoff without a surface outflow of water in which the drawdown of the basin is accomplished through infiltration of stormwater into the ground.

Return Period

The average interval of time within which a given rainfall event will be equaled or exceeded once; expressed in years. Expressed as a percentage of chance, a one hundred (100) year return period storm has a one percent chance of occurring in any one-year period.

Runoff Coefficient or C-Factor

A decimal fraction relating the amount of rain which runs off a parcel of land to the total amount of rain falling. So expressed as a percentage, a C-factor of .25 means that twenty-five (25) percent of the rain falling on a parcel of land can be expected to discharge from that parcel of land.

Specific Energy S

Specific energy (sometimes called “specific head”) is defined as sum of the depth and velocity head of the flow.

Stage

The stage of a channel is the elevation of the water surface above some elevation datum.

Steep and Mild Slope

A steep slope culvert operation is where the computed critical depth is greater than the computed uniform depth. A mild slope culvert operation is where critical depth is less than uniform depth.

Storm Drain

Underground pipe system designed to intercept and convey stormwater runoff to an adequate outlet.

Stormwater Drainage Facility

Any single part or any combination of parts of a system designed and/or constructed to gather, convey, store and discharge rainfall.

Stormwater Drainage System

A complete combination of facilities designed and constructed to gather, convey, store, and discharge rainfall in an orderly fashion.

Storm Drains Submerged

Underground pipe systems designed to intercept and convey to an adequate outlet stormwater runoff where the hydraulic grade line elevation greater than the inside crown of the pipe.

Submerged Inlets

Submerged inlets are those inlets having a hydraulic grade line elevation greater than the rim elevation of the inlet (ponding water).

Submerged Outlets

Partially submerged outlets are those outlets whose tailwater is higher than normal depth and lower than the height of the culvert. Submerged outlets are those outlets having a tailwater elevation higher than the crown of the culvert.

Surveyor or County Surveyor

The Decatur County surveyor, or duly appointed representative.

SWCD

The Decatur County soil and water conservation district.

Symbol Table

To provide consistency within this section as well as throughout this ordinance the following symbols will be used. These symbols were selected because of their wide use in hydrologic publications. In some cases the same symbol is used in existing publications for more than one definition. Where this occurs in this chapter, the symbol will be defined where it occurs in the text or equations.

<u>Symbols</u>	<u>Definition</u>	<u>Units</u>
A	Area	ft ² or acres
a	Fitting Values	-
b	Fitting Values	-
C	Runoff Coefficient	-
C _{SF}	Stability correction factor	-
C _{SG}	Specific Gravity correction factor	-
C _D	Weir coefficient of discharge coefficient	-
CN	SCS-runoff curve number	-
D	Duration	Hours
D	Depth of Flow	ft
DA	Drainage Area	mi ²
D _i	Size of riprap for which “i” (e.g. 100, 50, or 15) equals the percent of stone diameters which are smaller	
g	Acceleration due to gravity	ft/s ²
H	Head on orifice	ft
H _L	Sum of energy loss	-
HW	Headwater depth above invert of culvert (depth from inlet to upstream total energy grade line	ft
i	Rainfall intensity	in/hr
I _a	Initial abstraction from total rainfall	In
K	Side slope correction factor	-
L	Flow Length	ft
N	Fitting Values	-
n	Manning roughness coefficient	-
P	Accumulated rainfall	in
P _w	Wetted perimeter	ft

Q	Rate of runoff	cfs
Q _r	Allowable release rate	cfs
Q _v	Runoff depth	in
q _p	Peak rate of discharge	cfs
R or r	Hydraulic Radius	ft
S _m	Potential maximum retention	in
S or s	Bed slope or Slope of hydraulic grade line	ft/ft
S _f	Friction slope	ft/ft
S _G	Specific gravity of stone	lb/ft ³
S _X	Cross slope	ft/ft
SF	Stability factor	-
SL	Main channel slope	ft/mi
T	Channel top width	ft
T _d	Shear stress	lbs/ft ³
T _L or T	Lag time	hours
T _p	Time to peak	hours
T _p	Permissible shear stress	lbs/ft ³
T _t	Travel time	hours
T _w	Tailwater depth	ft
t	Storm duration	min
t _c or T _c	Time of concentration	min
V or v	Volume	Ft ³
v	Velocity	ft/sec
V _f	Huff storm factor	-

Time of Concentration (t_c)

The time of concentration is the time required for water to flow from the most remote point of the basin to the location being analyzed. Thus the time of concentration is the maximum time for water to travel through the watershed, which is not always the maximum distance from the outlet to any point in the watershed.

Tributary

A stream, waterway, channel, or other conduit of stormwater contributing upstream drainage into the drainage system of a project.

Unit Hydrograph

A unit hydrograph is the direct runoff hydrograph resulting from a rainfall event which has a specific temporal and spatial distribution and which lasts for a specific duration of time (thus there could be a 5-, 10-, 15-minute, etc., unit hydrograph for the same drainage area). The ordinates of the unit hydrograph are such that the volume of direct runoff represented by the area under the hydrograph is equal to one inch of runoff from the drainage area.

Uniform Flow

Uniform flow is flow in a prismatic channel of constant cross section having a constant discharge, velocity and depth of flow throughout the reach. In uniform flow it is assumed that the depth of flow is the same at every section of the channel.

Wet Bottom Detention Basin

A basin designed to hold a permanent pool of water after providing its planned detention of

stormwater runoff.

Article 3-Plan submittal policy and procedures

Section 3.1-Professional certification

Plans, computations and specifications submitted for review under this ordinance shall be professionally certified by a registered professional engineer or registered professional land surveyor as defined by Indiana statute.

Section 3.2-Construction plan and design computation standards

Project plans and supporting data submitted for review that fail to contain the following minimum requirements are subject to administrative rejection and return to the applicant with a letter requesting the missing information.

All applications for a permit under this ordinance will require the following documents:

1. Stormwater Permit Application.
2. Stormwater Plans.
3. Stormwater Design Report.
4. Erosion Control Plan.

The following is a description of the required information for each of these items.

Stormwater Permit Application-The application form contains two parts. Part A is to be filled out by the applicant and provides basic information about the project including the names and addresses of the owner, engineer or surveyor, and contractor; legal address of the property; and nature of the proposed activity. Part B will be filled out by the review staff.

Stormwater Plans-The stormwater plans should include the following items:

1. Plans shall be sealed by a registered professional engineer or registered professional surveyor licensed in the State of Indiana.
2. Plans shall be drawn on 24" by 36" standard engineering plan sheets.
3. The scale shall be adequate to clearly depict the proposed activities as well as the existing contours and features of the site.
4. The plans shall include a north arrow.
5. The plans shall include a site vicinity map on the cover sheet that clearly denotes the location of the project site.
6. The plans shall include the location and datum of the benchmark used for the plans. The

benchmark datum shall represent the actual elevation above mean sea level. Arbitrary datum may be allowed for sites less than five (5) acres in size or sites with only one or two lots at the discretion of the Decatur County Plan Commission if the site is not located in a FEMA flood hazard zone.

7. The plans shall clearly denote the existing and proposed ground contours. The existing and proposed contours shall be shown at one-foot intervals and should be based on site-specific detailed surveying or aerial mapping. Proposed contours can be shown as spot elevations if the density is sufficient to clearly illustrate surface grading and drainage patterns.
8. The plans shall include information concerning offsite watershed areas that affect the site. Although the offsite information does not need to be given the level of precision as the onsite information, it shall clearly denote the drainage area, drainage patterns and other pertinent hydrologic and hydraulic parameters needed to address the drainage system performance for pre-project and post project conditions.
9. The plans shall clearly denote the locations of all existing and proposed stormwater facilities such as culverts, inlets, stormsewers, ditches, creeks, rivers, ponds, lakes and swales. The data for each facility shall include the physical dimensions of the facility such as rim elevations for inlets; invert elevation, material, size, end treatment and length for pipes; normal water level and surface area for ponds and lakes; flowline elevation and channel geometry for open channels; and surface grades and slope for paved areas. The features included on the plans shall clearly indicate the existing and proposed drainage patterns for the project.
10. The plans shall denote existing and proposed property boundaries, right-of-way boundaries and easements.
11. The plans shall denote the boundaries and base flood elevations of any FEMA special flood hazard area and/or floodplain and floodway boundaries derived from a site specific engineering study.
12. In addition to information concerning the drainage system itself, the plans shall also include the grades of other structures such as buildings, utility facilities and roadways that may be impacted by the drainage system.
13. The plans shall include a pre-project and post project onsite and offsite (if needed) drainage area delineation map. The watershed drainage area for each entry point of stormwater runoff into the proposed drainage system shall be delineated.
14. If the proposed project involves a platted subdivision or if the proposed drainage system will drain an offsite watershed area greater than five (5) acres, a profile of the proposed drainage system shall be required in addition to the plan view. The profile shall be plotted at the same scale as the plan view and shall be depicted on a standard plan and profile sheet. It shall include the existing ground profile, proposed drainage system profile and locations of underground utilities that may conflict with the drainage system. The plan and profile shall extend far enough upstream and downstream of the project site to clearly demonstrate the connectivity to adjacent drainage systems. Additional

information may be required on a case-by-case basis at the discretion of the Decatur County Plan Commission

Stormwater Design Report-This report shall contain technical information in support of the project plans. It shall contain a narrative of the pertinent aspects of the proposed project as well as detailed calculations and a summary of key results demonstrating compliance with this ordinance. The level of detail will vary for each project, but shall be proportional to the size and scope of the project. The following is a description of the computational and narrative elements expected for most reports.

1. A narrative report shall describe the existing and proposed drainage conditions and facilities in a “big picture” manner. For example, if the downstream drainage system is in poor condition or contains a collapsed culvert or similar failure, the report should discuss the effects of this condition on the project site and the impacts of the proposed project on the problem (solve it, worsen it or no impact). Where warranted photographs should be included to help the reader understand the situation. Special attention should be given to the ability of the proposed drainage system to accept and convey offsite stormwater as well as the ability of the downstream system to accept stormwater from the site. Often a “common sense” or “big picture” narrative with maps and photographs are needed in addition to computations because the computations alone do not adequately portray the field conditions. The report shall clearly summarize the key concepts supported by the calculations, including summary tables of relevant input and output data.
2. Design calculations and/or computer input/output data shall be included. The calculations shall conform to the minimum standards of this ordinance. Alternative design methods not contained in this ordinance shall be approved on a case-by-case basis if the applicant demonstrates that the resultant drainage system performance will comply with the minimum standards. Typical drainage design calculations will include drainage area calculations, runoff coefficients or SCS curve numbers, times of concentration, runoff hydrograph computations, stormsewer and culvert hydraulic computations, inlet grate and gutter flow capacity computations, open channel flow computations, hydraulic grade line computations, and detention basin/infiltration basin flood routing computations. All calculations should clearly indicate the source of the input data, a list of assumptions and conventions, and the nature of the equations or techniques used.

Erosion Control Plan-The erosion control plan can be included on the grading and drainage plan for small projects, but shall be furnished as a separate plan sheet for platted subdivisions or commercial sites containing more than one (1) acre of disturbed area. The plan shall denote erosion control features such as silt fencing, straw bale dams, silt basins, etc. to be used on the project. Each design element shall include a standard detail drawing demonstrating the materials and installation techniques.

If a Rule 5 (327 IAC 15-5) plan is required for the project, this plan will generally be sufficient for this purpose. If required, the Rule 5-approved erosion control plan shall be included in the plan set along with documentation of approval.

Section 3.3-Requirements for Single and Double Family Dwellings

Applications for drainage permits for single and double family dwellings will generally require less detailed information than shown above. Following is a description of the minimum requirements for a single family or double family (duplex) dwelling:

1. A legible, scaled site plan.
2. A legal description of the property.
3. The legal address of the property.
4. The name of the owner of the property.
5. Existing and proposed grading, drainage features and dimensions.
6. Existing and proposed drainage flow directions.
7. A north arrow.
8. A site location map.
9. A detailed or typical lot grading plan or detail showing positive drainage away from the building.

Although the level of detail for single or double family dwellings is not as great as that for larger projects, additional information may be needed to assure that drainage features such as swales or culverts accepting offsite stormwater are set at the proper grade and have adequate capacity. Where adjacent properties or roadways may be impacted, it shall be demonstrated that the proposed project will not result in flooding, standing water, erosion or sedimentation on these adjacent areas.

Foundation drain and sump pump outlets shall be constructed in a manner that will not result in flooding or drainage problems on adjacent properties or road right-of-ways, including icing problems on roadway or driveway surfaces. If an adequate swale, ditch, stream or stormsewer is not available, the foundation drain or sump pump outlet shall be directed into the yard area of the property on which the single or double family is being constructed such that the residential structure and adjacent properties/rights-of-ways are protected from flooding or drainage problems.

Section 3.4-Plan approval required to start construction

Final drainage plan approval shall be obtained before physical activity is undertaken to construct the project with the exception of such testing as typically is required to determine procedures or materials to be used.

Section 3.5-Plan approval required to record a plat.

Final drainage plan approval shall be obtained prior to the recording of a plat of a major subdivision.

Section 3.6-Conditions of drainage plan approval.

In order for an applicant to obtain approval of a final drainage plan, the following requirements must be met:

1. The applicant shall be eligible under the terms of this chapter to apply for and obtain drainage plan approval.
2. The drainage plan and supporting submittals required by this chapter shall have been prepared and submitted in a timely and proper manner in accordance with the provisions of this chapter.
3. The drainage plan and supporting submittals shall reflect compliance with the requirements of this chapter, and compliance with any conditions of approval applied to the plan by the APC.
4. The submitted data shall be gathered, analyzed, assembled into the drainage plan and supporting submittals; and shall be certified, and presented to the APC all by a civil engineer or land surveyor regularly engaged in stormwater drainage design, and registered to practice in the state of Indiana.
5. An easement has been dedicated to house any off-site drainage facilities if such facilities are required to serve the project's stormwater drainage system.
6. The person, persons, partnership, corporation, or other entity to whom approval of the drainage plan is granted must be the person, persons, partnership, corporation, or entity who will be responsible for accomplishing the project for which the drainage plan is developed.

Section 3.7-Conditions of plan approval remaining in force.

In order for the approval of the final drainage plan to remain in force, the following conditions shall be met:

1. The applicant shall notify the Director and the APC site review committee prior to making any modification of the approved drainage plan.
2. The applicant shall obtain approval of the drainage plan when making a major modification of the plan.
3. Materials Change Constitutes Major Modification. A change from the materials designated in the approved drainage plan shall constitute a major modification requiring approval by the board.
4. Detailed "As-Built" Plans Required. The applicant shall agree to submit, and shall submit within thirty (30) days of completion of the drainage facilities of a project, two

complete sets of as-built plans to the APC which shall show every detail of the finished installation of all storm water drainage facilities for the completed project.

5. Final Inspection After Delivery of "As-Builts." The final inspection of the drainage facilities shall be made only subsequent to the delivery of one set of the as-built plans to the APC; and shall be based upon said as-built plans.
6. The applicant shall install and maintain the street system and the storm drainage system until the project has been completed, or until maintenance of such systems is assumed by others.
7. The applicant shall agree to remove, and shall remove sediment from, or repair erosion damages to all property where such damage has been caused by the project.
8. The applicant shall allow the drainage board, or agents of the drainage board, to enter the project to verify compliance with this chapter or to bring the project into compliance with this chapter.
9. The applicant shall develop methods of maintenance for all drainage facilities, and shall have printed clearly on the plat, and/or other documents of record for the project, the developed methods of maintenance.

Section 3.8-Enforcement of drainage plan approval

The APC shall make inspections, or shall order inspections to be made of a project site to ensure compliance with the requirements of this chapter, and other terms and/or conditions attached to the approval of a drainage plan and/or a street plan.

The APC may deny, withdraw, or suspend approval of a drainage plan if the board determines that:

1. The requirements of this chapter are not met in full;
2. Other terms and/or conditions of the approval of a final drainage plan and/or a street plan are violated;
3. A drainage plan or a street plan or an attached submittal contains a false statement or a misrepresentation;
4. Some part of a drainage plan or a street plan is not executed in good faith, or is not executed in accordance with the various plans approved by the boards;
5. A project is undertaken without an approved final drainage plan;
6. An alteration or a modification is made to a drainage system prior to the completion of a project, which alteration or modification is not documented to or authorized by the board and/or their appointed representative in accordance with the requirements of this chapter.

Section 3.9-Remedies for violations of the terms of plan approval

The APC may take such actions as the board deems necessary and legal to remedy a violation of the terms and/or conditions of plan approval, or may take such actions as the board deems necessary and legal to bring a project determined not to be in compliance with the requirements of this chapter into such compliance.

Levying a Fine for Violations. Levying a fine equal to not more than one hundred dollars (\$100.00) per day per violation determined to exist after thirty (30) days beyond the date on which a notice of the violation was sent by registered mail to the last known address of the party determined by the drainage board to be the party responsible for the violation of the terms and/or conditions of plan approval, and/or to be the party responsible for the condition of the drainage system which is not in accordance with the requirements of this ordinance.

The Fine shall be levied against the Violator. A fine as described in this ordinance shall be levied against the party determined by the board to have violated the terms and/or conditions of plan approval, or against the party determined by the board to be the party to have caused the condition of the drainage system which is not in accordance with the requirements of this chapter.

Correcting Violations by Contractual Services. The APC also may contract for work to be accomplished to bring a project, or a part thereof, into compliance with the requirements of this chapter, and/or the terms and conditions of plan approval; and the APC shall bill the cost of such work to the property owner upon whose property the work is accomplished.

The APC may apply a tax lien to collect payment. If the APC contracts for work to correct a violation and the owner of the property upon which the work is accomplished fails to pay for the costs of the work as billed by the board within ninety (90) days of the mailing date of the bill, the board shall apply a tax lien in an amount equal to the cost of the work against the subject property.

Disposition of Moneys Collected for Contractual Works. All moneys collected from property owners for works contracted by the board to correct violations, whether said monies are collected directly from the property owners or collected through tax liens, shall be deposited into the same repair accounts from which the moneys to pay the costs of the works were withdrawn originally.

Section 3.10-The APC and the county commissioners may act together

In the levying of a fine, and/or in the contracting for work to correct violations as described in Section 13.04.110, the APC board and the county commissioners may take the actions described in Section 13.04.110 either separately or together.

Section 3.11-APC site improvement permits conditioned

The area plan commission shall not issue an improvement permit on a project requiring final drainage plan approval until such approval has been given.

Section 3.12-Building permits conditioned

The Decatur County Building Commissioner shall not allow construction of buildings, or other impervious structures or facilities to commence at the site of a project requiring final APC plan approval until:

1. Such approval has been expressed by the APC board
2. And all storm drainage facilities are constructed

Section 3.13-Phased development of large projects allowed

Large projects may be divided into phases for the purpose of constructing drainage facilities and obtaining permits in accordance with the requirements of this ordinance.

Section 3.14-Preliminary and final submittals

Drainage submittals for preliminary plat approval are not required to contain final design information but must include the overall drainage plan including detention facility sizing information as well as a preliminary downstream and upstream analysis.

Section 3.15-Plan submittal and review process

1. Drainage Plan Required. It is the policy of the board of county commissioners of Decatur County, Indiana, hereinafter referred to as the commissioners, that an engineered drainage plan be submitted to the Area Plan Commission referred to as the APC, for any new development, redevelopment, new construction, addition to existing construction, or other land disturbing activity located within the commissioners' and/or the APC's jurisdiction which shall result in the addition of impervious surfaces exceeding a total of ten thousand (10,000) square feet.
2. Subject Development Defined as Project. Any new development, redevelopment, new construction, additional construction, or other land disturbing activity which shall result in the addition of impervious surfaces totaling over ten thousand (10,000) square feet, hereinafter shall be called a project.
3. Drainage Plan Submittal. The engineered drainage plan for a project shall be submitted, in triplicate, to the Decatur County Area Plan Commission, 150 Courthouse Square, Greensburg IN 47240 no later than two full weeks prior to the meeting at which the engineered drainage plan is to be presented.
4. Drainage Plan Review Route. The Decatur County Area Plan Director hereinafter referred to as the Director will determine the route of review, in accordance with this chapter, for an engineered drainage plan, hereinafter referred to as the drainage plan submitted for a project.

Section 3.16-Processing of Incomplete applications

If the plan review staff determines that an application is incomplete or otherwise fails to comply with the minimum standards contained in this ordinance, a comment letter will be issued to the applicant listing the deficiencies. At that time the applicant may, at his discretion,

withdraw the application; furnish the requested information, revise the plans, or schedule a meeting to discuss the issues.

The Decatur County Plan Commission will place the application in abeyance for a period of sixty (60) days from the date of the comment letter. If the abeyance period lapses without re-submittal, the application will be terminated and the applicant will be notified of such. Any subsequent application for the project will require a new submittal, including any applicable review fee.

Section 3.17-Variances

It is recognized that the minimum standards contained in this ordinance will occasionally result in undue hardship on the applicant that is not justified by the policies and objectives of this ordinance. If the applicant believes that a deviation from the minimum standards is warranted, he may file a request for a variance. Variance requests shall conform to the following policies and procedures:

1. A request for variance shall not occur until the plan review staff has completed a technical review of the application.
2. The request for a variance shall include a detailed listing of the specific elements of the project requiring a variance and the justifications for the issuance of said variance. The certifying engineer or surveyor shall prepare a formal variance request report that outlines the specific justifications for the variance request and attend meetings with the plan review staff and Decatur County Board of Zoning Appeals as needed.
3. The plan review staff shall review the variance request and prepare technical comments and recommendations concerning their support or lack of support for the requested variance.
4. The Decatur County Board of Zoning Appeals will convene a variance hearing within 30 days of the request to decide the matter. The decision of the Decatur County Board of Zoning Appeals will be considered final.
5. If the Decatur County Board of Zoning Appeals issues the variance, it may impose specific conditions upon the applicant deemed necessary to protect the public interest.

Section 3.18-Plan submittal checklist

1. A complete and accurate stormwater permit application.
2. A title sheet which shall include:
 - a. Vicinity location map of the proposed project;
 - b. Name/title of project including section number if applicable;
 - c. Owner and Designer's Name;

- d. Professional seal and signature; and
 - e. Date of Plan and Revisions
3. A plan sheet showing existing site conditions and improvements, site boundaries with routes, courses, and distances, and a legal description of the property.
4. A site development plan which includes the following information:
- a. Existing site land contours with sufficient spot grade elevations identified utilizing USGS control elevation datum.
 - b. All other existing site improvements and their elevations, including those existing stormwater utilities with appropriate invert and casting elevations, identified utilizing USGS control elevation datum.
 - c. Proposed site grading with sufficient spot grade elevations and contours, including building pad locations and elevations.
 - d. The locations of all proposed stormwater facilities, including: storm structures, pipes, open culverts, open drainage channels, subsurface drainage systems, pipe outfall locations and end treatments, and detention/retention facilities. Proposed pipe and culvert invert elevations, top of casting elevations, and swale/channel flowline elevations utilizing USGS datum shall also be included.
 - e. The location of proposed site improvements such as buildings, streets, roads, entrance and exit drives, acceleration/deceleration lanes, and parking areas, with sufficient proposed grade elevations utilizing USGS datum.
 - f. Existing and proposed easements, rights-of-way, property lines, and associated record instrument numbers.
 - g. A delineation of the floodway/floodway fringe boundaries of flood hazard areas, including a citation of the regulatory source for these boundary delineations, and minimum flood protection grades. Each lot within a platted single- or double-family subdivision shall be provided with 100 Year floodway fringe elevation information and the associated minimum lowest enclosed area building floor elevation. For commercial and industrial projects, each individual permanent structure proposed within the development site shall have the minimum lowest enclosed area floor elevation identified.
 - h. Locations of surveying bench marks and their elevations and descriptions.
 - i. Drainage flow arrows.
5. A site plan of off-site stormwater facilities and proposed improvements, if any, with sufficient existing land contours, proposed spot grade elevations, and abutting permanent structures and their elevations, as required by the Department. Plan/profile drawings of planned improvements within the downstream stormwater facilities shall also be included.
6. Entrance and exit drive details showing proposed site grading.

7. Storm drain plan and profile sheets which includes identification of hydraulic grade lines for pipes with submerged outlets, ditch crossings, and potential conflicts with other existing or proposed stormwater facilities, sanitary facilities, or other utilities.
8. Construction/installation details and specifications, including:
 - a. Pipe bedding and backfill for each pipe material
 - b. Erosion and sediment control practices and seeding requirements.
 - c. Storm drain manhole and box inlet construction.
 - d. Pipe end treatment details, including standard end sections.
 - e. Subsurface drain tile installation methods with typical swale cross-sections.
 - f. Proposed lake cross-sections. The proposed lake cross-section may be delineated within the construction plans through use of a typical cross-section.
 - g. Appropriate details for special structures.
9. For those sites proposing a land disturbance of sufficient size to fall within the jurisdiction of 327 IAC 15-5 (Rule 5), an erosion and sediment control plan and supporting documentation prepared in conformance with 327 IAC 15-5.
10. A complete Technical Information Report in conformance with this ordinance.

Article 4-Hydrology

Section 4.1-Rainfall and Runoff Methods

The Natural Resources Conservation Service (NRCS) Unit Hydrograph Method is the preferred rainfall-runoff computation method due to its ability to assess temporal and volumetric aspects of a rainfall-runoff event. It is a widely accepted method for which numerous computer applications have been developed. Input data include the total storm event rainfall amount, a rainfall distribution mass curve (hyetograph), hydrologic soil group, time of concentration and runoff curve number.

For peak discharge computations, a design hydrograph is developed based on a storm duration that is equal to the cumulative time of concentration at the downstream point in the subject drainage area. Since input data is generally available for the 1, 2, 3, 6, 12, 24 and 48 hour storm durations, it is acceptable to use the next higher rainfall duration if the time of concentration falls between published durations. For example if the T_c is 1.5 hours, the 2 hour duration storm event should be used.

For detention storage computations it is necessary to evaluate a range of storm durations to find the design event that maximizes the required storage volume. This is called the critical duration event.

The Rational Method is acceptable for peak discharge computations on drainage areas less than two hundred (200) acres. Input data for this method include the runoff coefficient, the drainage area and the rainfall intensity. To select the correct rainfall intensity it is necessary to calculate the time of concentration.

This method was the standard for several years prior to the development of the personal computer which alleviated much of the computational tedium of using the NRCS Unit Hydrograph Method. The rational method computes the peak discharge for a given storm frequency event at a point. It does not determine the volume or temporal distributions of the hydrograph although the original formula has been manipulated to approximate these elements in an equation called the modified rational method.

The rational method is acceptable for culvert, open channel or stormsewer design where detention storage computations are not required and the onsite drainage area is less than fifty (50) acres. Many stormsewer design computer programs use the rational method. These programs are acceptable, however the detention storage computations, if necessary, will require the use of the NRCS Unit Hydrograph Method.

A Department of Natural Resources regulatory peak discharge recommendation letter or other evidence of DNR approval of a computed peak discharge is required for watersheds exceeding one square mile (640 acres) at the downstream end of a project site. Generally this value will be the required input data for computations involving projects within DNR's jurisdiction (upstream drainage area exceeds one square mile). Hydrograph computations for this application should either be obtained from DNR or otherwise calibrated to match the hydrograph peak to the DNR-published peak discharge value.

Other methods such as regression formulas or stream gage data will be reviewed on a case-by-case basis.

Section 4.2-Rainfall Amount

There are several sources for rainfall data. The sources used in this ordinance are the Indiana Department of Natural Resources RAINFALL FREQUENCY FOR INDIANA manual (November, 1994 edition) and RAINFALL FREQUENCY ATLAS OF THE MIDWEST – BULLETIN 71. New manuals will be adopted as they are published by the State of Indiana. Rainfall data commonly used for drainage computations have been listed in the following tables; however data for events not listed can be obtained directly from the DNR manual.

The following tables shall be used for drainage computations reviewed under this ordinance unless otherwise approved by the Decatur County Plan Commission. The first table, Total Event Rainfall Amounts, is derived from Bulletin 71 and should be used for input into the NRCS Unit Hydrograph Method. The second table, Intensity-Duration-Frequency, is derived from the IDNR Rainfall Frequency for Indiana manual and should be used for input into the Rational Method.

Total Event Rainfall Amounts-Decatur County, Indiana

HOURS	MINUTES	RETURN PERIOD – RAINFALL DEPTH					
		2	5	10	25	50	100
.5	30	1.08	1.35	1.57	1.91	2.20	2.53
1	60	1.37	1.71	2.00	2.43	2.80	3.21
2	120	1.69	2.11	2.46	2.99	3.45	3.97
3	180	1.87	2.33	2.72	3.30	3.81	4.38
6	360	2.19	2.73	3.19	3.87	4.46	5.13
12	720	2.54	3.17	3.70	4.49	5.18	5.95
24	1440	2.92	3.64	4.25	5.16	5.95	6.84

Intensity-Duration-Frequency-Decatur County, Indiana

HOURS	MINUTES	RETURN PERIOD – RAINFALL DEPTH					
		2	5	10	25	50	100
0.08	5	4.60	5.60	6.40	7.40	8.00	8.50
0.17	10	3.50	4.50	5.00	6.00	6.60	7.10
0.25	15	3.00	3.80	4.40	5.10	5.70	6.20
0.50	30	2.00	2.70	3.10	3.70	4.10	4.50
1	60	1.25	1.75	2.10	2.60	2.80	3.10
2	120	0.79	1.20	1.40	1.70	1.80	2.00
3	180	0.57	0.81	0.98	1.25	1.45	1.60
6	360	0.34	0.48	0.58	0.68	0.77	0.86
12	720	0.20	0.27	0.33	0.38	0.43	0.48
24	1440	0.12	0.15	0.18	0.22	0.23	0.26

Section 4.3-Rainfall distribution

There are two widely used rainfall distributions in Indiana. The NRCS Type II rainfall distribution is the traditional mass curve that has been used in the Midwest for many years. A new rainfall distribution, the HUFF rainfall distribution, was first developed by the Illinois Water Survey (Bulletin 71) and subsequently in various forms by Purdue University and the City of Indianapolis.

In general, the HUFF distribution yields a flatter hydrograph with a significantly lower peak than the NRCS Type II distribution. It is considered by many to reflect or more realistic hydrograph shape than the Type II distribution. It also is better suited to evaluating a range of storm durations inasmuch as the Type II distribution was developed only for the 24 hour event. The disadvantages to using the HUFF rainfall distribution are twofold: First, the Federal Emergency Management Agency (FEMA) currently may not accept the use of the HUFF rainfall distribution in some cases unless the accompanying Bulletin 71 rainfall data are used. Second,

the peak discharges are so much lower than that of the Type II distribution that certain built-in factors of safety which accounted for occurrences like blocked culverts, additional development, etc. have been lost.

For this ordinance, the HUFF distribution has been adopted for use for drainage computations that do not involve FEMA flood zones. Computations prepared to determine the 100 year frequency base flood elevation within a FEMA A or B zone shall utilize the peak discharge provided by DNR or FEMA. If a discharge is not available from DNR or FEMA, the NRCS Type II distribution shall be used in conjunction with the 24 hour duration storm event unless the use of the Huff distribution and Bulletin 71 rainfall amounts are approved by DNR and/or FEMA as required for the project.

For drainage computations not requiring the use of the Type II distribution, the HUFF rainfall distribution may be used. There are four different HUFF dimensionless rainfall distributions published in Bulletin 71. The first quartile distribution should be used for storm durations of 0.1 to 6.0 hours. The second quartile distribution should be used for storm durations of 6.1 to 12.0 hours. The third quartile distribution should be used for storm durations of 12.1 to 24.0 hours. The fourth quartile distribution should be used for storm durations exceeding 24.0 hours.

Huff Median Time Distribution at a Point

CUMULATIVE STORM TIME IN PERCENT	FIRST QUARTILE PERCENT OF RAINFALL	SECOND QUARTILE PERCENT OF RAINFALL	THIRD QUARTILE PERCENT OF RAINFALL	FOURTH QUARTILE PERCENT OF RAINFALL
0	0	0	0	0
5	16	3	3	2
10	33	8	6	5
15	43	12	9	8
20	53	16	12	10
25	60	22	15	13
30	66	29	19	16
35	71	39	23	19
40	75	51	27	22
45	79	62	32	25
50	82	70	38	28
55	84	76	45	32
60	86	81	57	35
65	88	85	70	39
70	90	88	79	45
75	92	91	85	51
80	94	93	89	59
85	96	95	92	72
90	97	97	95	84
95	98	98	97	92
100	100	100	100	100

Article 5-Hydraulics

Section 5.1-Design Methods

Hydraulic design can be accomplished with either manual calculations or with the use of one of several computer programs that involve use of the Mannings Equation. Computations that incorporate the use of the Mannings Equation or more sophisticated backwater or dynamic flood routing methodologies are acceptable. The use of alternative methods will be allowed on a case by case basis.

Section 5.2-Downstream Analysis

Unless specifically waived by this ordinance or the Decatur County Plan Commission, all drainage permit requests shall include in the drainage design report a downstream analysis. The distance downstream of the site and the required level of detail of the analysis will vary with the condition and capacity of the downstream receiving drainage system as well as the size and potential impact of the proposed project. Tables have been provided at the end of this ordinance to assist the designer in evaluating the drainage outlet(s) for a project site. As a general rule, the downstream analysis should include the following:

1. An area drainage map showing the proposed project site and the downstream drainage system extending downstream of the site to a point at which the disturbed portion of the proposed project site represents only 10% of the watershed area draining to the downstream point. For example, if a proposed project site is 5 acres, then the downstream analysis should generally extend downstream to a point where the drainage system drains 50 acres.
2. Photographs, drainage capacity calculations and a discussion of critical conveyance points within the downstream system such as culverts, stormsewers or open ditches. The analysis should focus on the weakest points in the system such as undersized or collapsed culverts, blocked open channels, etc.
3. A summary of the proposed project's expected impacts on the downstream drainage system and the efforts made on the plans to minimize the impacts.

The Decatur County Plan Commission has the right to impose additional detention requirements and/or downstream improvements if it determines that the minimum standards contained in this ordinance do not adequately protect life and property from drainage hazards imposed by the proposed project.

Section 5.3-Upstream Analysis

If the proposed project site conveys stormwater from offsite watershed areas upstream of the site, the drainage permit requests shall include in the drainage design report an upstream analysis. The upstream analysis will generally include the following:

1. An area drainage map that delineates the upstream watershed area that drains through the proposed project site.
2. Drainage design computations indicating the design peak flow rates at the entry point into the proposed project site. These computations will need to include hydrographs if the

upstream watersheds are to be routed through onsite detention/retention basins or ponds.

3. A discussion of any unique characteristics of the upstream watershed area or the proposed project's design for conveying the offsite runoff. This may include such items as future development impacts of the upstream watershed, diversions of upstream watersheds to "bypass" systems within the proposed project site, upstream system deficiencies, etc.

Section 5.4-Gutters and inlets

Drainage inlet grates and curbed gutter lines (if used) within proposed projects shall be designed to comply with the following minimum standards:

1. The 10 year frequency peak discharge (Q^{10}) shall be the design storm event.
2. Inlets shall be spaced such that the gutterline shall convey the Q^{10} such that one lane of traffic on a two lane road or two lanes of traffic on a four lane road are not flooded by gutter spread. A lane width is twelve (12) feet.
3. Inlet grates, whether on pavement or grassed areas, shall convey the Q^{10} with the grate assumed to be 50% blocked. The maximum depth of ponding around the grate shall be limited to six (6") inches unless it can be shown that additional ponding will not threaten surrounding structures or property.
4. Stormwater collection systems shall be designed to prevent runoff from overflowing into the public right-of-ways or adjacent properties unless provisions are made for the adjacent drainage systems to accept the overflows.
5. Overload Channels to Prevent Street Flooding Required. An overload channel from sag inlets to an overflow channel or basin shall be provided at sag inlets so that the maximum depth of water that is ponded in the street sag shall not exceed one-half foot for the design storm, assuming that the inlets are completely blocked.
6. Maximum Distance Between Street Inlets. The maximum distance between inlets for street drainage shall be six hundred (600) feet measured in the gutter.
7. Inlet grates shall be designed as "bicycle-safe" in accordance with the manufacturers specifications for projects deemed by the APC as expecting bicycle traffic.

Section 5.5-Stormsewer systems

Stormsewer systems shall be designed to comply with the following minimum standards:

1. The 10 year frequency peak discharge (Q^{10}) shall be the design storm event. The stormsewer shall be capable of conveying the Q^{10} in open channel flow conditions (pipe not under pressure).
2. The hydraulic grade line shall be checked for the Q^{100} event. Any location where the hydraulic grade line elevation exceeds the inlet rim elevation or adjacent ground surface

grade elevation (open pipe inlets), the drainage design report shall discuss the handling of surcharged stormwater from the system. Surcharged stormwater from the Q^{100} event shall either be safely stored over the structure or overflowed to a safe location.

3. All open end section inflow points larger than 15" in diameter shall be affixed with a "child protection" grate designed to prevent accidental entry of children into the stormsewer system during high water events. The grate should have bar spacing small enough to protect children while minimizing debris accumulation.
4. All stormsewer systems shall be designed to provide a minimum full flow velocity of at least 2.5 feet per second for the Q^{10} design storm event.
5. All stormsewer systems shall consist of either concrete or high density polyethylene (HDPE) pipe materials designed and backfilled in accordance with the manufacturer's specifications or those contained in other applicable Decatur County standards, whichever is more strict. All HDPE pipes shall be backfilled with No. 8 or No. 11 washed, crushed stone to a height of one (1') over the top of the pipe. Backfill material shall be compacted to at least 95% of the standard proctor density.
6. Metal stormsewer systems, except aluminum alloy pipes, are not acceptable.
7. Inlet and manhole structures shall be precast or poured in place concrete. Brick and mortar structures are not acceptable. The structures shall be properly backfilled with granular material to prevent subsidence. Over-excavation of the foundation material may be necessary if weak soils are encountered. The structures shall be provided with pre-cast or drilled inflow and outflow holes. Knock-out walls are not acceptable.
8. Additional structural or installation specifications not specifically mentioned herein shall be in conformance with the Indiana Department of Transportation Design Specifications, Decatur County regulations or the manufacturer's specifications, whichever is more strict.
9. Storm sewer pipe shall be aligned horizontally straight between manholes, inlets, and similar structures within the tolerances specified by the manufacturer or regulatory guidelines, whichever is more restrictive.
10. Where long radius curves are necessary to conform to street layout, the minimum radius of curvature shall be no less than fifty (50) feet, and allowable for sewers forty-two (42) inches in diameter and larger only.
11. Deflection of pipe sections shall not exceed the maximum deflection recommended by the manufacturer of the specific pipe to be installed, and that manufacturer's recommendation shall accompany the submittal; and only the type and size of pipe specified in such a submittal shall be installed.
12. All flexible storm sewer pipe and culvert material shall be covered by a minimum two (2) feet of cover unless the applicant submits detailed plans accompanied by manufacturers' recommendations specifying allowable cover less than this value.
13. All non-flexible storm sewer pipe and culvert material shall be covered by a minimum one

and a half (1.5) feet of cover unless the applicant submits detailed plans accompanied by manufacturers' recommendations specifying allowable cover less than this value.

Manholes shall be installed to provide access to continuous underground storm sewers for the purpose of inspection and maintenance. Manholes shall be provided at the following locations:

1. Where two or more storm sewers converge;
2. At the point of beginning of, or at the end of a curve; and at the point of reverse curvature (PC, PT, & PRC.);
3. Where pipe size changes;
4. Where an abrupt change in horizontal alignment occurs;
5. Where a change in storm sewer profile grade occurs;
6. At suitable intervals in otherwise straight sections of storm sewer runs, as specified in subsection B of this section.

Maximum Distances Between Manholes. The maximum distance between storm sewer manholes shall be as follows:

Size of Pipe in Inches	Maximum Distance in Feet
12 through 24	400
27 through 42	500
48 and larger	600

Section 5.6-Culverts and bridges

In addition to compliance with the following standards, any culvert or bridge that is intended for acceptance into the county culvert or bridge system or county roadway inventory shall also meet INDOT classification and design standards in addition to the following. Culverts and bridges shall be designed to comply with the following minimum standards:

1. Stream crossings that are within the jurisdiction of the Department of Natural Resources Floodway Permitting program, or within an INDOT right-of-way shall be designed to comply with the most strict of the DNR standards, INDOT standards or the minimum standards contained herein.
2. Open culverts or bridges shall be designed to convey the 25 year frequency peak discharge (Q^{25}) in an open channel flow (not under pressure) condition.
3. Open culverts or bridges shall be designed to convey the 100 year frequency peak discharge (Q^{100}) such that the maximum depth of road overflow is twelve (12") inches over the centerline crown of the road and the surcharge in the water surface profile upstream of the

culvert does not increase the 100 year flood elevation on upstream or adjacent properties over that of existing conditions by more than 6" (inches). The Decatur County Plan Commission may limit the allowable backwater profile surcharge and/or road overflow depth if the minimum standards contained in this ordinance do not adequately protect life and property. An example of this case would be the existence of buildings or other vulnerable improvements adjacent to or upstream of the site that are subject to inundation by the 100 year flood under existing conditions or would become vulnerable to inundation by the 100 year flood if the 6" surcharge occurred. In these cases the allowable surcharge is 0" (zero inches).

4. Open culverts or bridges that are designed to allow roadway overflow during the 100 year design event shall also be checked for the 10 year, 25 year and 50 year frequency storm events to assure that the surcharge in the water surface profile upstream of the culvert does not increase the flood elevation on upstream or adjacent properties over that of existing conditions by more than 3" (inches) for these smaller storm events. The Decatur County Plan Commission may limit the allowable backwater profile surcharge and/or road overflow depth if the minimum standards contained in this ordinance do not adequately protect life and property.
5. Open culverts and bridges should be provided with end treatments such as headwalls, wing walls or end sections as needed to protect embankments and outlet channel from erosion, the pipe from damage and to provide a smooth transition of stormwater into and out of the structure.
6. Culverts may consist of concrete, HDPE or metal. All metal pipes shall either consist of aluminum alloy or aluminized steel material. In addition, all culvert materials shall comply with the INDOT culvert standards. The Decatur County Plan Commission may impose additional standards on materials and installation as necessary.
7. Culverts and bridges shall be designed with adequate scour energy dissipaters at the inflow point, outflow point, around abutments and around piers. Scour protection shall be designed using standard engineering practice to protect the site and structure from the Q^{100} design event.
8. Culverts and bridges that are replacement structures for existing crossings where the road profile is not being altered may be designed to maintain the current hydraulic capacity and flood profile surcharge as the existing crossing. The Decatur County Plan Commission may impose additional standards if this standard would result in a continuation of an unacceptable hazard to life or property.
9. The method required to compute the hydraulic characteristics for culverts and bridges can vary depending upon the complexity of the application. Simple Mannings equation computations are acceptable for small culverts draining less than 5 acres of watershed. Larger culverts draining more than 5 acres of watershed should be analyzed with either a culvert design method such as the HY8 program or standard backwater programs such as HEC2, HECRAS or WSPRO. Applications that involve potential tailwater controls from downstream constrictions (such as another culvert) shall be analyzed in a manner that takes the tailwater control into account.

10. Any culvert, bridge, structure, pipe, earthwork, pavement, or utility installed within or across a regulated drain, or that land within seventy-five (75) feet either side of a regulated drain in Decatur County shall be subject to prior approval of the Decatur County drainage board and the Decatur County surveyor, per Indiana State Statute. (Ord. dated 10/31/94 § 1109)

Section 5.7-Open Channels

Open channels shall be designed to comply with the following minimum standards:

1. Collection swales and ditches within proposed projects shall be designed to convey the 10 peak discharge (Q^{10}) without overtopping the banks.
2. Large ditches that drain more than 50 acres shall be designed to convey the Q^{100} without overtopping the designed system. The channel may overflow if an overbank conveyance system is available to safely contain the Q^{100} flow. Existing ditches or natural streams that pass through the site do not need to be upgraded to design capacity unless the proposed project seeks to divert, enclose or otherwise significantly alter the conveyance.
3. Open channels shall be designed with a minimum longitudinal slope of one percent (1%). Where a 1% is not possible due to low site relief, an underdrain system or paved channel shall be used. If high ground water or other site conditions make the use of a paved channel or under drain system infeasible, the use of a wetland ditch may be considered for approval on a case-by-case basis. In such cases, the channel capacity shall be computed based on an un-maintained, fully-vegetated condition.
4. Open channels shall have a maximum vegetated side slope of 3 horizontal to 1 vertical. Rip rap or other channel armoring methods are acceptable with a maximum side slope of 2 horizontal to 1 vertical. Retaining wall designs using proper materials are also acceptable.
5. Open channels shall be designed to adequately protect the system from erosion during the design storm event.

Article 6-Stormwater detention and retention systems

Section 6.1-Overview

The purpose of stormwater detention and retention systems is to reduce the impact from development on the downstream drainage system and adjacent improvements such as buildings, roads and utilities. The hazards to be mitigated by the system include flooding, erosion, sedimentation and water quality degradation. In many cases the system can also provide an open space water feature that provides recreational, aesthetic and environmental benefits to the development and surrounding area.

A structure is considered a detention system if stormwater flow is attenuated but eventually flows out of the facility to the downstream drainage system. A detention structure can consist of a pond where a normal pool of water is maintained; a dry basin usually covered in grass or riprap; or an underground vault or pipe system allowing parking or other non-building

usage of the surface above the buried system. For very small sites, parking lot detention is sometimes feasible, however the depth of storage is limited as indicated below.

A structure is considered a retention system if stormwater does not flow out to the downstream drainage system but is instead allowed to infiltrate into the ground and evaporate. Retention systems are generally dry basins but can sometimes be ponds where a normal pool of water is maintained or even underground systems.

Due to the inherent uncertainty associated with stormwater infiltration, retention systems are generally used only in cases where site conditions limit the feasibility or effectiveness of detention systems. Due to the short term and long term vulnerability of retention systems that rely on infiltration of stormwater into the ground, great care must be exercised in the design of such systems as indicated below.

Section 6.2-Peak Flow Rate Design Standards

1. Flow attenuation shall be provided for each drainage outlet for a site. A design cannot over-detain the peak flow rate for one outlet to compensate for not attenuating the flow rate at another outlet. However the flow attenuation at an outlet can be accomplished without providing detention for each outlet by reducing the drainage area to the un-detained outlets such that the flow attenuation standards are satisfied. For example, if a site has two natural drainage outlets but the design calls for a single detention basin, it would be possible to divert a sufficient portion of the proposed conditions drainage area from the un-detained outlet to the detention system such that both outlets are protected and the standards satisfied. Diversions of drainage areas from their natural outlets, however, must be carefully evaluated to assure that downstream land uses that depend upon the natural flow of runoff are not adversely affected.
2. The stormwater runoff from the 100 year frequency design storm shall be attenuated such that the resultant proposed conditions peak flow rate does not exceed the pre-development peak flow rate from the 10 year design storm. A range of storm durations shall be analyzed to determine the critical duration event. The range of durations shall start at either the one hour event or the next duration larger than the time of concentration at the detention basin if it is greater than one hour. For example, if the T_c at the detention basin is 30 minutes, the first duration to be used is the 1 hour event. However if the T_c at the detention/retention basin is 2.5 hours, then the 3 hour event would be the first duration to be evaluated. The incremental durations to be evaluated include the 1 hour, 2 hour, 3 hour, 6 hour, 12 hour and 24 hour duration events. Often one duration storm is the critical event for peak discharge attenuation whereas another duration storm is the critical event for the maximum peak water surface elevation within the detention/retention basin.
3. The stormwater runoff from the 10 year frequency design storm shall be attenuated such that the resultant proposed conditions peak flow rate does not exceed that of the pre-development peak flow rate from the 2 year design storm. As with the 100 year frequency analysis, a range of storm durations shall be analyzed to determine the critical duration event.
4. The stormwater detention facility shall be designed to return to at least 90% of its design

storage capacity within 24-hours following the end of the design rainfall event.

5. For the pre-development peak flow computations, it is only necessary to calculate the value for the minimum duration storm event which will be the target peak flow rate for the proposed conditions events regardless of the duration. For example, if the pre-development time of concentration is less than 1 hour, only the 1 hour pre-development duration need be run. This value would then represent the target flow rate for all of the proposed condition runs for that frequency event.
6. The minimum diameter of a detention basin/pond control structure orifice and the minimum width of a detention basin/pond control structure weir notch is 4 inches (except for ponds as discussed in section 6.4). Due to potential blockage problems associated with smaller openings, the level of flow attenuation using this minimal sized control structure is considered acceptable, even if the pre to post target flow reductions are not achieved. Any opening that is less than 12 inches in diameter or width shall be limited to use as a restrictor plate or structure wall within the outlet control structure. This less than 12" restrictor opening should be placed on the upstream side of a culvert pipe or open channel that has a diameter or width of at least 12 inches. For example if an outlet control structure consists of a drop structure connected to a culvert pipe that passes underneath the pond berm, the restrictor should be cast into the pond-side face of the structure. The outlet pipe should have a diameter of at least 12" to avoid clogging of the pipe with debris and silt.

Section 6.3-Emergency spillway design standards

1. An emergency spillway system shall be included in any design application where the uncontrolled overtopping of the detention/retention system would threaten the structural integrity of the facility itself or adjacent improvements or property. The exact configuration of the emergency spillway system will depend upon the specific application. The purpose of the system is to safely convey flows that exceed the capacity of the detention/retention to the downstream drainage system in a manner that minimizes risk to the structural integrity of the facility itself and adjacent improvements or property.
2. The design flow for emergency spillways shall be 1.25 times the highest proposed conditions 100 year frequency peak flow rate into the detention/retention facility. The emergency spillway system shall be designed, using the standard weir equation, to convey this design flow rate and velocity such that the surrounding improvements and property are at least one foot above the level of flow in the emergency spillway. This emergency spillway capacity shall be analyzed with the assumption that no storage is available within the detention/retention basin and that all other outlets are blocked.

Section 6.4-Structural design standards

1. Wet detention/retention ponds shall be provided with a safety ledge that limits the depth at normal pool to 1 foot or less for the first 10 feet out from the edge of water. At least 40% of the pond area at normal pool shall be provided with a normal pool depth of at least 8 feet. Adequate erosion control shall be provided along the banks within the zone

of water level fluctuation through the use one or a combination of rip-rap, hydrophytic vegetation, shallow bank slopes, retaining walls, erosion control/turf reinforcement blankets or other suitable means.

2. Dry detention/retention basins shall be provided with adequate bottom slopes to allow for maintenance. The bottom longitudinal and transverse slopes shall be at least 1%. Where a 1% bottom slope is not feasible, an underdrain system shall be utilized to promote the drying out of the bottom between storm events. Where both a 1% bottom slope and an underdrain system are not feasible, a paved invert may be used or the basin can be designed as a wetland type basin incorporating a natural wetness and maintenance-free hydrophytic vegetation.
3. The maximum steepness for grassed side slopes along detention/retention basins is 3 horizontal to 1 vertical. The maximum steepness for rip rapped side slopes is 2 horizontal to 1 vertical. The maximum steepness for grassed side slopes in residential developments is 5 horizontal to 1 vertical.
4. Earthen embankments that constitute a levee with a depth of water exceeding 3 feet against the embankment during the critical (for peak water surface elevation) 100 year design event shall be designed as a small dam. The embankment material shall be compacted to a standard proctor density of at least 95% and an impervious cutoff trench shall be provided along the length of the levee portion of the embankment to prevent under-seepage. Other structural measures may be required on a case-by-case basis depending upon the potential hazard associated with a failure of the embankment.
5. The minimum diameter of a standard orifice is 4" and the minimum width of a notched weir is 4". Outlets small than the minimum shall not be used even if the peak flow attenuation standards cannot be satisfied. An exception to this is the application of a smaller orifice for stormwater quality on wet basins. In these cases, a turn-down siphon will be required down to a diameter of 2 inches.
6. Offsite drainage areas contributing runoff to the project site do not need to be mitigated by detention however must be safely conveyed through or around the site. The design storm peak discharge value for offsite areas can be added to the allowable release rate for the onsite detention facility, however the peak volume and flood stage within the facility should reflect the total onsite and offsite runoff contributing to the facility.

Section 6.5-Retention system design standards

1. Retention basin systems or other drainage systems that rely on infiltration are considered by this ordinance to be more vulnerable to short term and long term failure than systems that include gravity flow of stormwater via an open or enclosed conduit to an adequate outlet such as a river or ditch. All infiltration-based system design reports shall be accompanied by an engineering study that discusses the reasons justifying the use of infiltration instead of traditional gravity flow conveyances.
2. Retention basin systems or other drainage systems that rely on infiltration shall include a detailed geotechnical study that addresses issues such a design infiltration rates and

ground water table effects. In general, infiltration rates shall be based on the lowest values within the range of values determined within the geotechnical report and the groundwater table shall be considered to be at its highest level for design purposes.

3. Infiltration basins shall be designed to safely store the entire volume of the 24 hour, 100 year frequency runoff hydrograph for proposed conditions assuming no infiltration. Decatur County Plan Commission standards are the same as for detention basins/ponds.
4. Infiltration basins shall be designed with the same bottom and side slopes standards as detention basins/ponds. Due to the infiltrative nature of the bottom material, additional attention should be paid to assuring continued percolation of stormwater through the basin invert.
5. Infiltration basin designs shall include a provision for conveying overflows to relatively safe locations such as streets or ditches as opposed to homes or rear yard areas.
6. Infiltration systems that rely on leach fields similar to septic finger systems shall not be allowed.
7. Infiltration systems that rely on dry wells shall be designed to safely store stormwater around the structure should runoff intensity exceed infiltration capacity and be connected via equalizer pipes to adjacent drywells to allow for the diversion of stormwater from a plugged drywell to a working drywell. A worst case scenario analysis for zero infiltration shall be included in the design report. For this analysis the entire volume of the 24 hour, 100 year frequency runoff hydrograph shall be stored within the drywell structure and area surrounding the drywell.

Section 6.6-Parking lot stormwater storage

Parking lots may be designed to provide temporary detention of stormwaters on all or a portion of their surfaces.

1. Maximum Depth in Parking Lots. Depths of storage should be limited to a maximum depth of six inches to prevent damage to parked vehicles.
2. Storage Areas in Parking Lots to be Striped. A pattern for painting the parking area designated for stormwater detention shall be employed to alert vehicle owners to the possibility of stored water in the event of storms.
3. Storage in Parking Lots Exceeding Six Inches Depth. A separate pattern for painting the lot shall be developed for all areas where the detained volume of water will exceed six inches in depth; and such a pattern shall be highly visible, and easily recognizable as a warning.
4. Confining Storage in Parking Lots. In general, ponding should be confined to those portions of the parking lot farthest from the area served, or parts of the lot likely to be used the least.

Section 6.7-Waiver of detention standards

Stormwater detention and retention systems are structural facilities specifically designed

to slow the runoff from developed sites for the primary purpose of protecting downstream drainage systems and adjacent property. Hazards including flooding, bank erosion, bridge and road damage and degradation of water quality are all associated with the uncontrolled runoff of stormwater from developed sites. Generally the larger the site and percent of impervious surface, the greater the potential for downstream impacts. Another important factor is the condition and hydraulic capacity of the downstream drainage system. A third consideration is the value and vulnerability of affected property along the downstream waterway.

Although detention and retention systems are useful stormwater management tools, they can be costly to build and maintain. This ordinance recognizes that there are instances where stormwater detention or retention systems are not needed. A typical example of this is the case in which the proposed site is very small and the immediate downstream drainage system is very large. Stormwater attenuation for a half acre site along the banks of a large creek or river, for example, would probably have a negligible benefit of reducing the peak flood flow in the river. As long as the erosion and water quality impacts to the immediate downstream area were addressed, the direct release of stormwater runoff into such a water body may be acceptable.

The determination of the need for peak runoff flow attenuation can be difficult when the case is not as obvious as described above. This ordinance provides the following guidelines for screening direct discharge candidates. Due to the subjective nature of this determination, the final determination shall be made by the Decatur County Plan Commission.

Sites may be considered for a waiver of detention when the overall conditions indicate that detention is not required to protect downstream property. Projects that satisfy the following conditions may be considered for waivers of detention:

1. The drainage area of the project site (disturbed area only) is less than one percent of that of the immediate downstream receiving waterway. For example if the downstream waterway had a drainage area of 500 acres (project site + upstream watershed), the project site could have a drainage area of up to 5 acres.
2. The time of concentration of the project site (disturbed area only) is less than ten percent of that of the immediate downstream receiving waterway. For example if the downstream waterway had a time of concentration of 100 minutes at the location of inflow from the project site, the project site could have a time of concentration of up to 10 minutes.
3. The peak discharge for the 100 year frequency storm for all applicable design durations shall not increase by more than one percent as a result of the direct discharge of runoff from the project site. This determination can be accomplished by developing hydrographs for the various storm durations. The receiving waterway's hydrograph is added to the pre-development and post development in turn and compared to one another. For example, if the combined hydrograph peak discharge for pre-development conditions is 230.0 cfs on the receiving waterway, the allowable increase for that duration event is 2.3 cfs.

In addition to the above screening guidelines, others factors that may be considered in the review of waiver of detention requests include:

1. The size of the site.

2. The location within the watershed (lower or upper end).
3. The amount of proposed impervious surface.
4. The amount of increase in impervious area for redevelopment projects.
5. The existence of known drainage problems downstream of the site.
6. The condition of the downstream waterway.
7. The potential for downstream water quality problems if waiver of detention is approved.

The burden shall be on the requestor of waiver of detention to provide evidence to the Decatur County Plan Commission that detention is not needed. The Decatur County Plan Commission may direct the requestor to send a public notice of the request to downstream property owners to allow for public comment prior to making a final determination.

Article 7-Drainage easements

Section 7.1-Pipe easements

All storm sewer pipes that are not located within dedicated street rights-of-way shall be housed in easements dedicated for the purpose of accessing the storm sewer facilities to perform maintenance thereon if the pipe segment is located within a platted subdivision or if the pipe segment conveys runoff from more than five (5) acres of contributing drainage area, including the sum of onsite and offsite drainage areas.

1. Pipe centered in easements. The easement lines generally shall be parallel to and equidistant from the centerline of the pipe run.
2. In cases where the pipe is not centered in the easement, the outside wall of the pipe shall be no closer to the closest easement line than one half the vertical distance from the flowline of the pipe to the dirt grade; and pipe alignment and location shall be shown clearly on the as-built plans.
3. Minimum easement widths. The easement shall be a minimum ten (10) feet in width for pipes up to twenty-four (24) inches in diameter, and a total of twelve (12) feet plus the diameter of the pipe, with the total rounded off to the next larger even number of feet, for pipes larger than twenty-four (24) inches in diameter.
4. Off-centered and combination easements. The adequacy of design for combination easements housing storm sewers with other utilities shall be adjudged by the board on a case-by-case basis.
5. Pipe collars, headwalls, and aprons are required. A collar, headwall, and/or drop box shall be provided on the upstream end, and an apron on the downstream end of all open-ended pipes in the storm sewer system.

Section 7.2-Channel easements

All channels that are not located within dedicated street rights-of-way shall be housed in easements dedicated for the purpose of accessing the channel to perform maintenance thereon if the pipe segment is located within a platted subdivision or if the pipe segment conveys runoff from more than five (5) acres of contributing drainage area, including the sum of onsite and offsite drainage areas.

1. All channels shall be centered in easements dedicated for the purpose of accessing the drainage facilities to perform required maintenance.
2. Off-centered designs may be approved by the drainage board when a specific need is demonstrated for such an easement layout.
3. Easements for open channels shall be a minimum width equal to the width of the channel plus:
 - Six feet out from the tops of each bank for channels less than two feet deep;
 - Ten (10) feet out from the top of each bank for channels up to two to four feet deep;
 - Twelve (12) feet out from the top of each bank for channels greater than four feet deep.
4. The widths given above are the bare minimums required for minimal channel maintenance. Additional footage may be required for other utilities.
5. Utilities Not Allowed Within Three Feet of Channel. Except for approved utility installations crossing open drainage channels no trench wall shall be allowed within three feet of the top of bank of any open channel; and no utility appurtenance shall be allowed to protrude greater than two inches above finished dirt grade within six feet of the top of bank of any channel.
6. Grass Cover of Easement Required. The entire area of the channel easement shall be maintained perpetually in an established grass cover, or other approved vegetative cover materials.
7. Fencing and Fixtures Restricted in Easements. Fencing, landscaping appurtenances, other fixtures whether publicly or privately owned, as well as designs for combination easements housing public utilities or private appurtenances together with drainage facilities, shall be allowed by the board on a case-by-case basis when the drainage plan includes adequate provisions for the perpetual maintenance of unobstructed stormwater drainage.

Section 7.3-Detention facility easements

All detention facilities that are not located within dedicated street rights-of-way shall be housed in easements dedicated for the purpose of accessing the detention facilities to perform maintenance thereon if the pipe segment is located within a platted subdivision or if the pipe segment conveys runoff from more than five (5) acres of contributing drainage area, including the sum of onsite and offsite drainage areas. The easement area shall encompass the 100 year peak pool of the detention facility with adequate space for the access of maintenance equipment.

Article 8-Inspection of constructed systems

Section 8.1-Inspection of storm sewer system installation

The Area plan director, Highway Superintendent or engineer representing Decatur County shall inspect, or cause to be inspected, all installations of storm sewer systems in projects subject to the requirements of this chapter; and shall keep a permanent record of the findings thereof, in accordance with the following:

1. Inspections of Work in Progress. The Area plan director, Highway Superintendent or engineer representing Decatur County shall inspect or direct the inspection of all installations of storm sewer materials both within dedicated road rights-of-way, and within designated drainage and/or public utility easements at the same time as such materials are installed; and shall keep a permanent record of the findings of such inspections filed in the appropriate office.
2. Twenty-Four Hour Advance Notification of Work to be Inspected. In order for county personnel to be scheduled to inspect work in progress, the applicant must notify the Area plan director, Highway Superintendent or engineer representing Decatur County a minimum of twenty-four (24) hours in advance of the proposed storm sewer installation.
3. If work to install storm sewer system proceeds without the required notification, and/or if such work proceeds without an inspector assigned to the site, a violation of this chapter shall exist, and storm sewer systems installed in violation thereof are subject to denial of acceptance for maintenance by the county, and/or denial of repairs paid by funds held by the county.
4. Other remedies may be proposed and/or enforced by the APC and/of the commissioners for violation of the required twenty-four (24) hour advance notification.
5. The record of the inspections conducted by or under the direction of the APC shall be in the form of an inspection report which accurately shall describe the workmanship and materials used in the storm sewer system, and shall give an accurate accounting of either compliance or noncompliance with the requirements of this chapter.
6. Inspection Time to be Sufficient. The Area plan director, Highway Superintendent or engineer representing Decatur County shall schedule the inspections of storm sewer installations so that sufficient control of proper workmanship can be maintained and monitored by inspections of no less than a composite total of two hours per project per day.

Section 8.2-Deflection Testing Flexible Pipe

All storm sewer constructed of flexible pipe, including pipe manufactured from Polyvinyl Chloride (PVC), High Density Polyethylene (HDPE), and Corrugated Metal Pipe (CMP), shall be inspected or tested for deflection in accordance with the following:

1. Pipes sized thirty-six (36) inches or smaller in diameter, which cannot be inspected and measured for deflection with video cameras, visual inspection, or manual measurement to the satisfaction of the Area plan director, Highway Superintendent or engineer representing

Decatur County to determine less than five percent (5%) deflection, shall be tested using a mandrel.

2. The mandrel shall be pulled by hand without mechanical assistance, and the mandrel test shall be a “go/no-go” procedure.
3. The mandrel shall be approved the Area plan director, Highway Superintendent or engineer representing Decatur County prior to use to certify that the mandrel is rigid, nonadjustable, has an odd number of legs not less than nine (9), and has a length not less than its nominal diameter.
4. The diameter of the mandrel at any point shall not be less than the allowed percentage of deflection of the certified actual mean inside diameter of the pipe being tested.
5. The mandrel shall be fabricated of metal, fitted with pulling rings at each end, stamped or engraved on some segment other than a runner with the nominal pipe size and the mandrel’s outside diameter.
6. For any vertical or horizontal deflection test, pipe failure shall be defined as five percent (5%) or greater deflection of the tested pipe’s internal diameter.
7. The Project Site Owner/Operator shall perform, or shall cause to be performed, all required deflection tests no sooner than thirty (30) days after final backfill has been placed over the pipe to be tested.
8. Pipe inspection and test methods, procedures, and equipment, whether conducted or employed for mandrel testing or other inspections necessary to comply with this section, shall be subject to the Area plan director, Highway Superintendent or engineer representing Decatur County approval, and all tests and inspections must be conducted in the presence of the Area plan director, Highway Superintendent or engineer representing Decatur County.
9. The pipe inspection and test results must be reviewed and certified the Area plan director, Highway Superintendent or engineer representing Decatur County prior to final acceptance or release of the storm sewer facilities and applicable portion of the letter of credit covering the storm sewer and associated improvements.
10. All flexible pipe failing the deflection test within the warrantee period shall be replaced or caused to be replaced by the project site owner or operator at no cost to the County.
11. For flexible pipes larger than 36 inches diameter, inspection, measurement, and determination of deflection shall be achieved by methods and procedures approved by the Area plan director, Highway Superintendent or engineer representing Decatur County.

Article 9-Existing Ditch and Stream Maintenance

Section 9.1-Ditch condition responsibility of property owner.

If the county inspection determines that the grade, alignment, or general integrity of an existing channel has been altered, obstructed, or adversely affected by actions of a person not

authorized by the board to take such actions, the board shall order any obstruction or alteration removed; and the channel restored to its approved, or as-built condition according to plan(s), and at the expense of the property owner of record

Section 9.2-Order to remove obstruction or restore condition.

The order to remove an obstruction or alteration, and/or restore the channel to its approved, designed, or as-built condition shall be mailed to the property owner of record at the address to which county property tax statements are mailed.

Section 9.3-Remedy for improper or untimely repairs.

If work to restore the channel to its approved condition is not started within ten (10) days, and is not completed within thirty (30) days of the mailing of the notice, the board shall contract for the work to be completed, and shall bill the cost to the property owner of record.

Article 10- Responsibility for drainage facility maintenance

Section 10.1-Landowner responsible

The installation, maintenance, repair, and replacement of all stormwater drainage facilities, and erosion and siltation control measures for a project during the period of construction, and until final approval by the APC, shall be the responsibility of the land developer(s), and/or the property owner(s) of record.

The assignment of responsibility for the maintenance and repair of all stormwater drainage systems and facilities outside of county accepted road rights-of-way after the completion of the project, and final approval thereof by the APC, shall be determined before the final drainage plan is approved; and shall be documented by appropriate covenants and restrictions applied to the subdivision and to the property deeds thereof, and shall be printed clearly upon all recorded plats of the project.

For Projects Other Than Single-Family Residential Subdivisions. The maintenance and repair of all stormwater drainage facilities outside of county accepted rights-of-way after completion of a project other than single-family residential subdivisions, as defined in the Decatur County subdivision control ordinance shall be the sole responsibility of the property owner(s) of record.

For All Single-Family Residential Subdivisions. For all single-family residential subdivisions, as defined by the Decatur County subdivision control ordinance the maintenance and repair responsibility, after completion of a project, for all storm drainage facilities and systems outside of the county accepted road rights-of-way shall be determined by the Lot owners' association.

Article-11-Erosion and sediment control standards

Section 11.1-Overview

The erosion and sediment control standards in this ordinance apply to sites outside the

jurisdiction of 327 IAC 15-5 (Rule 5) which has stricter standards. The use of universally accepted Best Management Practices (BMP's) is strongly encouraged.

Land disturbing activities usually involve the temporary disruption of the natural or man-made surface cover that protects the underlying soils from being washed away by rainfall runoff. Care must be given to the temporary construction activity as well as the permanent land use design to conserve top-soil at the site and prevent impacts on downstream property and drainage facilities. This article includes minimum erosion and sediment control design and construction standards.

Section 11.2-Erosion and sediment control design standards

1. All erosion and sediment control design features shall be clearly depicted on the site grading plan or separate erosion and sediment control plan.
2. The down-slope perimeter of all construction sites shall be protected with site grading, properly installed silt fencing, temporary diversion berms or other approved method that prevents silt laden runoff from carrying suspended soil particles from the site onto downstream property and drainage systems.
3. The length of time that bare soil is exposed to runoff forces during a construction project shall be minimized. Stockpiles or other bare soil that will not be permanently revegetated or otherwise involved with construction for more than 30 days after disturbance shall be covered with temporary seeding, erosion control blankets or straw mulch until it is ready for additional work.
4. Sloped ground surfaces or the flowline of grassed-lined swales shall be covered with erosion control mulch blankets properly staked down to prevent failure. Long continuous ground slopes shall be further protected from rill formation with cutoff berms at the top of slope that drain runoff to slope drains or inlet structures. All erosion control products shall be installed in accordance with the manufacturer's specifications.
5. Locations of concentrated runoff within the site and at the drainage outlets of the site shall be protected from erosion scour with properly designed energy dissipaters and flowline armoring. A range of design techniques from rip rap to soil bioengineering, or a mixture of various techniques, is acceptable as long as the design objectives are satisfied. The design storm for erosion control is the same as that for the hydraulic design, which depends upon the size of the upstream drainage area.
6. Construction entrances shall be covered in coarse aggregate to minimize the tracking of mud from the construction site onto public roads and/or truck tires shall be washed off prior to leaving the site if tracking mud onto public roads begins to occur. Public roads shall be cleaned by the land disturbing entity as necessary to keep mud off the roads.
7. All inlets and culverts shall be protected from siltation with the use of straw dams or silt fencing. At the end of construction, silt shall be removed from drainage structures as needed to achieve design capacity.

Appendix A

Project Drainage Outlet Evaluation

Project: _____

Outlet Identification: _____

Prepared by: _____ Date: _____

PROJECT SITE DRAINAGE OUTLET LIFE AND SAFETY HAZARD TABLE

LIFE AND SAFETY PARAMETER	LIFE AND SAFETY SCORING			PARAMETER SCORE
	1	2	3	
DESIGN STORM WATER DEPTH	over 3 feet	1 – 3 feet	less than 1 foot deep	
DESIGN STORM WATER VELOCITY	over 5 feet per second	1-5 feet per second	less than 1 foot per second	
DESIGN STORM WARNING TIME	little warning time	moderate warning time	good warning time or not applicable to system	
DESIGN STORM RISK OF ENTRAPMENT	significant risk of entrapment or falling into system	moderate risk of entrapment or falling into system	little risk of entrapment or falling into system or not applicable to system	
DESIGN STORM SELF-RESCUE ACCESS	difficult self-rescue potential	relatively easy self- rescue potential	very easy self rescue or not applicable to system	
DESIGN STORM AGENCY-RESCUE ACCESS	difficult agency-rescue potential	relatively easy agency- rescue potential	very easy agency rescue or not applicable to system	
PROXIMITY TO VULNERABLE POPULATION	vulnerable population in immediate proximity to system	vulnerable population in vicinity to system	no vulnerable population in area or not applicable to system	
DESIGN STORM ROAD OVERFLOW DEPTH	over 3 feet	1 – 3 feet	less than 1 foot or not applicable to system	
DESIGN STORM DEBRIS FORCES	high risk of safety related debris risks	small risk of safety related debris risks	no risk of safety related debris risks or not applicable to system	
SYSTEM ACCESS SECURITY	easy access to public	limited access to public	no public access or not applicable to system	
TOTAL LIFE AND SAFETY SCORE	NOTES			

Copy the Total Life and Safety Score to the appropriate Parameter Score Box on the Drainage Evaluation Table.

Appendix A

PROJECT DRAINAGE OUTLET EVALUATION

Project:

Outlet Identification:

Prepared By: Date:

PROJECT SITE DRAINAGE OUTLET EVALUATION TABLE

EVALUATION PARAMETER	DRAINAGE OUTLET SCORING DESCRIPTIONS FROM 0-7 (WORST TO BEST)								PARAMETER SCORE	PARAMETER MULTIPLIER	PARAMETER TOTAL
	0	1	2	3	4	5	6	7			
PERCENT OF DESIGN CAPACITY	outlet totally blocked no overflow relief lack of conveyance path	outlet blocked but overflow relief available	less than 39% of regulatory design capacity	40% to 69% of regulatory design capacity	70% to89% of regulatory design capacity	over 90% of regulatory design capacity	100% of regulatory design capacity	exceeds regulatory design capacity		10.0	
SYSTEM STRUCTURAL CONDITION	severe erosion severely aged or damaged structures zero functionality	severe erosion severely aged or damaged structures low flow functionality	moderate erosion significantly aged or damaged structures medium flow functionality-but stable	minor erosion moderately aged or damaged structures functionality with likely further degradation	minor erosion moderately aged or damaged structures functionality with further degradation unlikely	very minor erosion or minor aged or damaged structures with little effect on functionality	no erosion and all structures in fairly good condition with no impact on functionality	system in excellent structural condition		5.0	
SYSTEM BLOCKAGES	system completely blocked by silt, debris or other material zero functionality difficult to clear	system completely blocked by silt, debris or other material zero functionality easy to clear	system blocked by silt, debris or other material up to 50% functionality difficult to clear	system blocked by silt, debris or other material more than 50% functionality easy to clear	system blocked by silt, debris or other material more than 50% functionality difficult to clear	system blocked by silt, debris or other material less than 50% functionality	system contains minor silt, debris or other material slight loss of functionality	zero or very minor blockages of any kind		5.0	
FLOOD DAMAGE POTENTIAL	apparent frequent flooding of multiple building structures or major public roadway	apparent frequent flooding of single building structure or minor public roadway	apparent occasional flooding of multiple building structures or major public roadway	apparent occasional flooding of single building structure or minor public roadway	apparent frequent flooding of multiple non- building structures or large scale property flooding	apparent minor overbank flooding with little risk to buildings, roadways or large overbank areas	apparent flood risk during catastrophic flooding events only	virtually no risk of flooding all design floods remain within channel or pipe no surcharging potential		5.0	
LIFE AND SAFETY HAZARDS	complete separate life and safety hazard table to compute total parameter score									1.0	
LAND USE DENSITY	not applicable	high density urban area	moderate density urban area	low density urban area	high density rural area	moderate density rural area	low density rural area	very low density rural area		3.0	
SYSTEM OWNERSHIP	not applicable	totally private system	mostly private system with some public components	mostly private system with most in a dedicated drainage easement	private system entirely within drainage easement	public system with some private components all within drainage easements	totally public system	totally public system designed for specific drainage system requirements		3.0	
APPARENT LEVEL OF MAINTENANCE	not applicable	no apparent maintenance activities	some apparent maintenance	apparent ongoing maintenance	not applicable	not applicable	not applicable	not applicable		3.0	
TOTAL DRAINAGE OUTLET SCORE	NOTES										

Letter Grade Conversion

248 - 256	A+	221 – 229	B+	194 – 202	C+	167 – 175	D+	0 - 148	F
239 - 247	A	212 – 220	B	185 – 193	C	158 – 166	D		
230 - 238	A-	203 - 211	B-	176 - 184	C-	149 - 157	D-		

Outlets scoring less than a C- may need further evaluation.